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Feeling happy when feeling down: The effectiveness of positive mental imagery in dysphoria

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Abstract

Background and objectives. Mental imagery can evoke strong emotional responses, but imagery perspective can influence the response, with observer perspective reducing emotionality. This is important provided that positive imagery can be an effective mood repairing strategy in healthy individuals. However, (sub-clinical) depressed individuals tend to spontaneously adopt an observer perspective. We investigated whether positive imagery would result in a similar emotional response in dysphoric and non-dysphoric individuals when instructed and trained to use field perspective imagery. Additionally, we compared the emotional response in dysphoric individuals who received instructions to dysphoric individuals who received no instructions on processing mode during positive memory recall.

Methods. Dysphoric and non-dysphoric individuals completed a mood induction procedure imagining positive or neutral memories. They received instructions and practice in the use of field perspective imagery. An additional control group of dysphoric individuals recalled positive memories without receiving instructions on processing mode.

Results. Dysphoric and non-dysphoric individuals who received instructions on field perspective imagery reported similar use of field and observer perspective imagery, and a similar positive emotional response. Dysphoric individuals who did not receive specific instructions, as compared to those who did, reported greater use of observer perspective and lower levels of positive affect afterwards.

Limitations. A dysphoric sample limits generalization to clinically depressed individuals, although these individuals are at risk for developing depression. However, mental imagery used in relapse prevention is likely targeting sub-clinical populations.

Conclusions. Providing practice in field perspective imagery could potentially improve the effectiveness of positive memory recall as a mood repair strategy in (sub-clinically) depressed individuals, and may therefore have important therapeutic benefits.

Keywords: positive mood induction, positive memory recall, mental imagery, imagery perspective, dysphoria

1. Introduction

Mental imagery has been used by researchers for a long time, but the use and applications of this technique has gained renewed interest in recent years. Mental imagery, encompassing visual as well as other sensory modalities, can have an important influence on emotion [1; 2]. It is therefore not surprising that mental images are believed to play a role in both the development and maintenance of different forms of psychopathology, such as posttraumatic stress disorder [3] and depression [2]. Although the use of mental imagery in psychotherapeutic interventions is not novel, the last decades have witnessed an increase in the application of mental imagery (e.g. imagery rescripting) for clinical purposes [4].

In the literature a distinction is made between imagery from a field perspective and imagery from an observer perspective. Field perspective can be described as individuals experiencing events through their own eyes, perceiving a situation as if they experience it at this moment from their in-body point of view, while observer perspective is described as individuals taking the perspective of a spectator, seeing themselves as characters in the imagined situation [5]. Both perspectives can be experienced during the retrieval of a memory [6]. When imagining autobiographic memories, imagery perspective can influence the type of information that is recalled. Memories imagined from a field perspective tend to include statements concerning affective reactions, physical sensations, and psychological states, whereas observer perspective memories include information concerning how the person looked, physical actions, or spatial relations [5]. Studies in healthy samples show that the perspective taken during imagery of memories can also influence the emotional response to the imagined event. For instance, imagery from a field perspective, as compared to an observer perspective and/or verbal processing, has been related to a greater emotional response [1; 7-9; but 10 reported no differences between imagery perspectives).

Interestingly, vantage point in mental imagery does not only seem to influence the intensity of the emotional response, but the different perspectives may even play a role in emotional disorders such as depression [11; 12; 13]. Previous research has shown that depression and dysphoria are related to a higher proportion of retrieving memories from an observer perspective [11; 14], though this may be specific for positive memories [12; 14]. Furthermore, dysphoria has been related to difficulties to vividly imagine positive future events and to lower positive ratings of visual images [15]. Depression is characterized by verbal processing of information in the form of rumination, which is in turn associated with reduced imagery and evaluative thinking about the self [e.g. 8]. Moreover, a higher occurrence of observer memories in depression has been linked to greater negative self-evaluation, greater use of avoidance, and dissonance between the current self and ideal self [11; 16]. This has led to suggest that a verbal processing mode or an observer perspective promote evaluative thinking and increase the likelihood that the self is compared to a more ideal standard, in turn promoting unfavorable self-comparisons reducing the positive affective response [7; 11].

In healthy individuals, the deliberate adoption of an observer (or third-person) perspective can have an emotion regulating effect by reducing negative emotions and related outcomes through the facilitation of a change in meaning or understanding of a negative situation, thereby functioning as a cognitive reappraisal strategy [17]. However, in depressed individuals, imagery of negative events or memories from an observer perspective is linked to greater avoidance and rumination [12; 13; 16]. Moreover, (spontaneous) use of observer perspective imagery also reduces the positive emotional response when imagining positive events or memories [7] and can reduce the effectiveness of using positive imagery as a mood repair strategy. Indeed, never depressed individuals can use positive autobiographical memory recall as a strategy to improve mood after a sad mood induction, but this has shown to be

ineffective for previously depressed individuals, and even had deteriorating effects for mood in currently depressed individuals [18]. A study in a subclinical dysphoric sample showed similar findings; whereas nondysphoric individuals could use positive memory recall to repair their sad mood, this was not effective in dysphoric individuals [19]. However, in these studies no instructions were provided on how to process the recalled positive memory. In a more recent study the effect of processing mode was investigated, that is, whether processing a positive memory in an abstract or more concrete way would influence the effectiveness of using positive memory recall to repair sad mood [20]. Currently and formerly depressed individuals were instructed to either think about a positive memory in terms of the causes and consequences of that event and its meaning (i.e. abstract processing), or to play the positive scene in their head like a movie (i.e. concrete processing). Using a more concrete way of processing the positive memory, as compared to abstract processing, resulted in improved mood [20]. A similar study with never-, formerly, and currently depressed individuals showed that processing positive memories in a more concrete way resulted in repair of sad mood for the never- and formerly depressed individuals (but abstract processing of positive memories did as well) [21]. However, depressed individuals could not use recall of positive memories to repair mood, regardless of processing mode [21]. One explanation for these mixed findings is that although the instructions for concrete processing of the positive memories may have promoted some form of imagery, it did not specifically promote field perspective imagery. Therefore, it's possible that, especially in depressed individuals, the concrete processing mode manipulation induced observer perspective imagery which in turn might have attenuated the positive emotional response.

The increased use of verbal processing and observer perspective imagery in (subclinical-) depressed individuals does not only reduce effectiveness of positive memory recall as a mood repair strategy but also affects applications of positive mental imagery in

treatment and relapse prevention. Research suggests that positive emotions play an important role in psychological resilience [e.g. the broaden-and-build theory; 22; 23]. Hence, positive mental imagery can be used to induce positive emotions and investigate the effects on psychological resilience. Although former research thus shows that depression and dysphoria are related to increased use of an observer perspective, reducing the emotionality of mental images [2], it remains unclear if positive imagery can elicit positive affect in (subclinical) depressed individuals when explicitly instructed and trained to use field perspective imagery.

The main aim of this study was to investigate whether positive mental imagery would be as effective in evoking a positive emotional response in dysphoric individuals as in nondysphoric individuals when explicitly instructed and trained to use field perspective imagery. This is relevant as a deliberate shift in imagery perspective (when imagining positive events/memories) can be used as an emotion regulating strategy and therefore also has implications for use in therapeutic settings. We hypothesized that dysphoric individuals who received explicit instructions and practice in field perspective imagery would show similar levels as nondysphoric individuals in self-reported use of field and observer perspective imagery during recall of a positive memory. Furthermore, we expected that the positive emotional response to the imagined positive event would be of similar magnitude in dysphoric and nondysphoric individuals when explicitly instructed and practiced in use of field perspective imagery.

A secondary aim of the study was to compare dysphoric individuals who were explicitly instructed and trained to use field perspective imagery to dysphoric individuals who received no such instructions during positive memory recall. Receiving no instructions allows for a more spontaneous way of processing the positive memory. Based on former research [e.g. 14] we expected dysphoric individuals who did not receive explicit instructions, as compared to dysphoric individuals who did receive such instructions during positive memory

recall, to adopt a field perspective to a lesser extent and an observer perspective to a greater extent. Moreover, we hypothesized that dysphoric individuals who did not receive explicit instructions, as compared to dysphoric individuals who did receive such instructions, to report an attenuated positive emotional response to positive memory recall.

2. Method

2.1 Participants

The data in this study was retrieved from six studies using the mood induction procedure (MIP) as described below (pooled data $n = 220$)[3]. The six studies were done across different periods in time. From the combined datasets of these studies, all thirty-four dysphoric participants who reported a score of 14 or higher on the BDI-II at time of testing were included. From all participants who reported a score of less than 7 on the BDI-II we randomly selected 34 persons. To be able to compare dysphoric individuals who received instructions on field perspective imagery to those who did not, we tested another twenty-eight participants who had been invited based on their BDI-II scores (i.e. cut-off BDI-II $\geq$ 14) in a pre-screening survey and they were tested in an extra control study. Eighteen of these participants were included in the analyses, as ten participants did not report a score on the BDI-II $\geq$ 14 at time of testing and were therefore not considered to be dysphoric at time of testing. In total 86 cases were analyzed (78 females), who were aged between 17 and 30 years (M = 19.84, SD = 2.48). All data was collected during studies approved by the local ethical committee and in accordance with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participants for being included in the study.

[3] Data from some of these studies has been used in the following publications: Grol, M., De Raedt, R. (2014). Effects of positive mood on attentional breadth for emotional stimuli. *Frontiers in Psychology, 5*: 1277. doi: 10.3389/fpsyg.2014.01277.
Grol, M., Koster, E.H.W., Bruyneel, L., & De Raedt, R. (2014). Effects of positive mood on attention broadening for self-related information. *Psychological Research, 78*, 566-573. doi: 10.1007/s00426-013-0508-6.
Vanlessen, N., Rossi, V., De Raedt, R., & Pourtois, G. (2013). Positive emotion broadens attention focus through decreased position-specific spatial encoding in early visual cortex: evidence from ERPs. *Cognitve, Affective, & Behavioral Neuroscience, 13*, 60-79. doi:10.3758/s13415-012-0130-x

2.2 Materials

2.2.1 Questionnaire measures. We used the self-report Beck Depression Inventory [BDI-II; 24; Dutch translation: 25) to measure presence and severity of depressive symptoms during the past two weeks.

We assessed trait anxiety using the trait version of the State and Trait Anxiety Inventory [STAI-trait; 26; 27]. Participants were asked to rate how they feel "*in general*" on a 4-point scale ranging from "almost never" to "almost always".

Mood state was measured using the state version of the 20 item Positive and Negative Affect Schedule [PANAS; 28]. Participants rated the degree to which they felt different emotions "*at this moment*" on a 5-point Likert scale ranging from 1 "very slightly" to 5 "very much".

The tendency to use mental imagery in daily life was assessed using the Spontaneous Use of Imagery Scale [SUIS; 29; 30]. The questionnaire consists of 12 descriptions about using mental imagery in daily life. Participants were asked to rate the degree to which each description is appropriate for them on a 5-point scale ranging from 1 "never appropriate" to 5 "always completely appropriate", resulting in a total score ranging from 12 to 60.

As a manipulation check during the mood induction procedure, participants were asked to rate the extent to which they adopted a field perspective and an observer perspective. Participants were asked to make their rating on a 5-point Likert scale ranging from 1 "not at all" to 5 "extremely". Both types of vantage perspective were assessed as previous research has shown that both perspectives can be experienced during the retrieval of a memory [6], even though instructions on using a field perspective are given in this study.

2.2.2. Mood induction procedure. An imagery procedure was used to manipulate mood in which participants were instructed to vividly imagine either a neutral- or happy-inducing autobiographical memory. Field perspective was first practiced using a mental

imagery task of cutting a lemon [7]. Following this practice task, participants were instructed to recall a memory of an event that happened on a specific day, more than one week ago. Participants in the positive MIP condition were instructed to recall an event that made them feel very happy at the time and happy as they think back to it, while participants in the neutral MIP condition were instructed to recall a memory that did not elicit strong negative or positive emotions when the event occurred. Participants were asked to close their eyes while imagining and describing in detail what they imagined. Participants were given instructions [based on 7; 31] to promote taking a field perspective while imagining the situation (e.g. "see it through your own eyes, from your own perspective") and to promote concreteness (e.g. "focus on how the event happened and imagine in your mind as vividly and concretely as possible a 'movie' of how the event unfolded"). Participants imagined the event for 30 seconds after which they were asked to focus on what they could see, hear, and feel (e.g. "What can you see?", "What physical or bodily sensations do you feel?") [based on 31]. Furthermore, they were asked to rate the manipulation check on adopting a field perspective and observer perspective and participants were told that we are interested in the extent to which they experienced both of these perspectives during recall. Following these questions, participants continued imagining the event for another 30 seconds without speaking up aloud about what they remembered. At the end, participants were asked again to rate the manipulation checks on adopting a field and observer perspective. During the mood induction, music was played to strengthen its mood-inducing effect. Across the experiments, different types of music were used in the positive mood condition: either Mike Oldfield's "Music of the spheres" (track 2, 3, 5, and 6), Chopin's "Waltzes Nos. 11 and 12", or Tchaikovsky's "Waltz of the flowers" and Mozart's "Eine kleine Nachtmusik". However, the different types of 'positive music' were balanced across dysphoric and non-dysphoric

participants. For the neutral MIP condition Chopin's "Waltzes Nos. 11 and 12" were always used, which have been used before in a neutral mood induction [32; 33].

In an extra control condition we used a similar positive mood induction procedure in which participants were instructed to recall a positive mood-inducing autobiographical memory of an event that happened on a specific day, more than one week ago. However, participants were not instructed to close their eyes, nor given instructions to promote taking a field perspective and to promote concreteness. Furthermore, the use of mental imagery was not practiced. Participants described the event for 30 seconds after which they were asked to rate the manipulation checks on adopting a field and observer perspective. After these checks, participants continued describing the event for another 30 seconds. At the end, participants were asked again to rate the manipulation checks. Similarly, as during the mood induction using mental imagery, music was played during the induction procedure. The different types of music used in the control positive mood induction were matched with the different types of music used in the positive imagery condition with dysphoric participants.

2.3 Procedure

Participants in the mental imagery conditions were randomized to receive either the neutral or positive MIP. After informed consent, baseline mood levels were measured with the PANAS. Following this, participants completed the MIP and at the end mood was measured again with the PANAS. At the end of the experiment the BDI-II and SUIS were administered. In the extra control condition everyone received the positive MIP without instructions on the use of mental imagery. Participants filled out the BDI-II, SUIS, and baseline mood levels were measured with the PANAS. This was followed by the MIP and after the MIP, the PANAS was administered again.

3. Results

3.1 Group Characteristics

Thirty-four dysphoric and 34 non-dysphoric participants were randomized to receive the happy or neutral mood induction. Furthermore, 18 dysphoric participants were assigned to the extra control condition receiving a positive MIP without imagery instructions. Table 1 gives an overview of the means and standard deviations for the baseline variables. A univariate ANOVA on the SUIS scale with the five groups as between-subjects factor showed no group differences, $F(4,76) = 0.36$, $p = .838$, $\eta_p^2 = .02$. By design, non-dysphoric participants scored significantly lower on the BDI-II than dysphoric participants, regardless of the mood manipulation condition they were in (see Table 1). Similarly, non-dysphoric participants scored significantly lower on the STAI than dysphoric participants (see Table 1), likely because of the strong correlation between BDI-II scores and STAI scores, $r = .80$, $p < .001$.

Table 1. *Group Characteristics*

	Dysphoric students *M* (*SD*)			Non-dysphoric students *M* (*SD*)	
	Neutral MIP (n = 16)	Positive MIP (n = 18)	Positive control MIP (n = 18)	Neutral MIP (n = 18)	Positive MIP (n = 16)
Age	21.19 (3.94)	19.17 (2.31)	18.89 (1.75)	19.78 (1.77)	20.38 (1.54)
Gender	15 females	18 females	13 females	17 females	15 females
BDI-II	22.38 (6.59)	19.28 (5.63)	22.50 (6.81)	2.06 (2.01)	2.38 (2.31)
STAI trait anxiety	52.27 (6.83)	53.83 (7.29)	60 (7.55)	36.94 (9.22)	35.44 (9.00)
SUIS	43.87 (6.77)	44.20 (9.05)	42.06 (6.95)	42.71 (8.90)	41.31 (8.24)

PANAS positive pre-MIP	27.63 (4.77)	28.67 (5.213)	26.00 (5.93)	35.78 (3.39)	33.87 (3.48)
PANAS positive post-MIP	26.19 (4.42)	35.56 (4.99)	30.44 (4.93)	35.55 (6.33)	37.50 (4.26)
Field perspective	4.16 (0.79)	4.14 (0.66)	3.97 (0.74)	4.44 (0.64)	4.20 (0.56)
Observer perspective	2.06 (0.95)	2.11 (1.06)	3.08 (1.06)	1.67 (0.77)	1.73 (0.56)

Note: Nonparametric Mann-Whitney tests confirmed that non-dysphoric participants reported higher levels of BDI-II scores compared to dysphoric participants (regardless of MIP group), all $p < .001$. Similarly, independent *t*-tests showed that non-dysphoric participants reported higher levels of STAI scores compared to dysphoric participants (regardless of MIP group), all $p < .001$. Dysphoric participants in the control positive MIP group reported higher STAI scores than dysphoric participants in the neutral MIP group, $t(31) = 3.06$, $p = .005$, $d = 1.07$, and dysphoric participants in the positive MIP group, $t(34) = 2.49$, $p = .018$, $d = 0.83$.

3.2 Imagery Perspective Manipulation Check

Nonparametric Kruskal-Wallis tests were performed to check for differences between the five groups on the ratings of adopting a field perspective and observer perspective during the MIP (see also Table 1). These analyses yielded no significant group effect for the field perspective ratings, $H(4) = 5{,}47$, $p = .242$; however, for the observer perspective ratings a significant effect of group was found, $H(4) = 18.54$, $p = .001$. Follow-up analyses revealed that dysphoric participants in the positive control MIP group reported higher levels of

adopting an observer perspective compared to all other groups, all *p*s < .050. We further examined the correlation between BDI scores and the ratings for observer and field perspective imagery. The positive control MIP group with dysphoric individuals was not included in this correlation analysis, because they received different instructions (which is therefore confounded with BDI score). Across all participants receiving the imagery MIP, the BDI was significantly related to the ratings for observer perspective, $r = .36$, $p = .003$, but not to the ratings for a field perspective, $r = -.15$, $p = .223$, suggesting that an increase in severity of depressive symptoms was related to higher self-reported use of observer perspective imagery.

3.3. Mood Manipulation Check

To assess the effect of the MIP with imagery on positive mood (see Figure 1), we performed a mixed ANOVA with Time (before versus after the MIP) as within-subject factor and MIP group (neutral versus positive with imagery) and Dysphoria (dysphoric versus non-dysphoric) as between-subject factors on the PANAS positive affect subscale. The ANOVA showed a significant main effect of Time, $F(1,64) = 13.48$, $p < .001$, $\eta_p^2 = .17$, a Time x MIP group interaction, $F(1,64) = 27.81$, $p < .001$, $\eta_p^2 = .30$, a non-significant Time x Dysphoria interaction, $F(1,64) = 0.93$, $p = .338$, $\eta_p^2 = .01$, and a marginally significant Time x MIP group x Dysphoria interaction, $F(1,64) = 3.28$, $p = .075$, $\eta_p^2 = .05$[4]. The Time x MIP group interaction was driven by a significant increase in levels of positive affect in participants in the positive MIP group, $t(33) = 5.60$, $p < .001$, $d = 1.09$, while participants from the neutral MIP group did not show such an increase, $t(33) = 1.28$, $p = .211$, $d = 0.13$. An independent t-test showed that dysphoric and non-dysphoric individuals receiving the positive MIP with

[4] This Time x MIP group x Dysphoria interaction was driven by a marginally significant Time x Dysphoria interaction in the positive imagery MIP group, $F(1,32) = 3.09$, $p = .088$, $\eta_p^2 = .09$. This reflects that the dysphoric participants receiving the positive imagery MIP tended to report a greater increase in PANAS positive affect than non-dysphoric participants receiving the positive imagery MIP; however, this may be an effect of baseline differences in positive affect such that the dysphoric individuals have more room to increase.

imagery did not differ in ratings of positive affect after the MIP, $t(32) = 1.22$, $p = .233$, $d = 0.42$, despite differences at baseline, $t(32) = 3.38$, $p = .002$, $d = 1.16$.

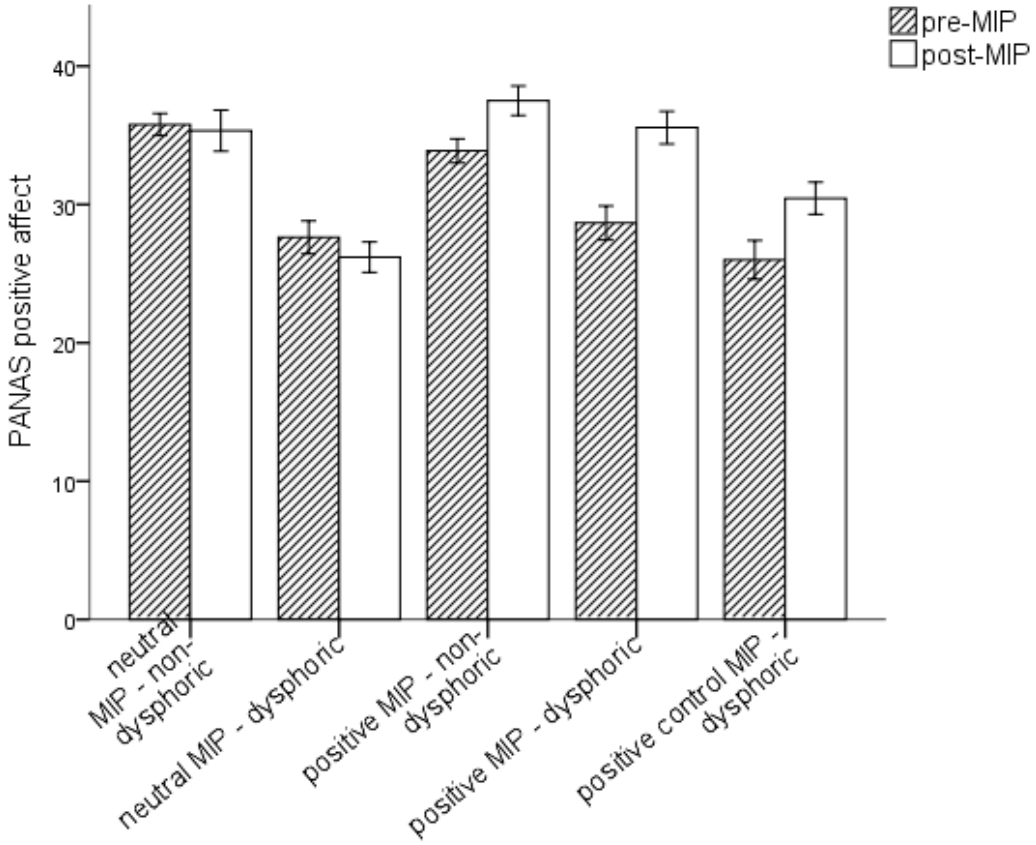

Figure 1. Mean scores on the PANAS positive affect subscale before and after the mood induction, depicted per group. Error bars represent standard error from the mean.

3.4 Effect of Imagery Instructions

We investigated differences in the positive emotional response between dysphoric participants who did not receive any instructions and dysphoric participants who were instructed to use field perspective imagery when imagining positive memories. Within dysphoric individuals, a mixed ANOVA was performed with Time (before versus after the MIP) as within-subjects factor and MIP group (positive with imagery versus positive control) as between-subjects factor on the PANAS positive affect subscale. This analysis yielded only

a significant main effect of Time, $F(1,34) = 30.61$, $p < .001$, $\eta_p^2 = .47$, but no Time x MIP group interaction, $F(1,34) = 1.42$, $p = .241$, $\eta_p^2 = .04$. Results remained similar when adding (as a covariate) ratings on adopting an observer perspective to the analysis. Paired samples t-tests showed that the dysphoric participants who received the positive MIP with imagery reported a significant increase in positive affect, $t(17) = 4.13$, $p = .001$, $d = 1.35$, as well as the dysphoric participants who received the positive control MIP without imagery instructions, $t(17) = 3.73$, $p = .002$, $d = 0.81$, in line with the result from the mixed ANOVA. However, although the change in positive affect did not significantly differ between these two groups, the dysphoric participants who received the positive MIP with imagery did report higher levels of positive affect after the induction, $F(1,33) = 7.07$, $p = .012$, $\eta_p^2 = .18$, when taking into account (as a covariate) variability in positive affect at baseline. Again, these results remained similar when also adding (as a covariate) the ratings on adopting an observer perspective. This discrepancy in results from the mixed ANOVA – indicating no group differences in the change in positive mood – and results from the ANCOVA – indicating that the group receiving instructions on field perspective imagery reported higher levels of positive affect after the MIP – may be explained by statistical issues. In randomized studies any pre-test group differences or variability is assumed to be due to sampling error. Using an ANCOVA (with the pretest measure as the covariate) minimizes the residual posttest variance, thereby minimizing the standard error of the group effect estimate, which increases power compared to an ANOVA on the change (i.e. the mixed ANOVA) [34]. Therefore, the ANCOVA analysis may have had more power to detect group differences at post-MIP controlling for pre-MIP variability in positive affect, as compared to a mixed ANOVA on group differences in the change in positive affect from pre- to post-MIP.

4. Discussion

The main aim of this study was to investigate whether imagery of positive autobiographical memories would be as effective in evoking a positive emotional response in dysphoric individuals as in nondysphoric individuals when explicitly instructed and trained to use field perspective imagery. Specifically, we investigated whether giving explicit instructions and practice in field perspective imagery would result in similar use of field and observer perspective imagery in dysphoric and non-dysphoric participants, and whether this would influence the emotional response. Our main findings show that dysphoric and non-dysphoric individuals who received instructions and practice in field perspective imagery indeed report to adopt a field and observer perspective to the same extent, and report a similar positive emotional response. That is, both dysphoric and non-dysphoric participants who receive instructions on field perspective imagery and recall a positive memory report an increase in positive affect, while those who recall a neutral memory do not. Across dysphoric and non-dysphoric individuals who receive instructions on field perspective imagery, the level of experienced depressive symptoms (i.e. BDI scores) relates to higher use of observer perspective imagery.

Compared to non-dysphoric individuals, dysphoric individuals have been shown to use an observer perspective for positive memories to a greater extent [14], less vivid imagery of positive future events, and rate visual images as less positive [15]. The current findings, however, suggest that dysphoric individuals are not necessarily unable to imagine (positive) memories from a field perspective to the same extent as healthy individuals. However, this may be a less spontaneous way of processing, as our current results and previous studies show that without explicit instructions on field perspective imagery, dysphoric individuals use more observer perspective imagery with positive memories [12; 14]. Furthermore, the results showed that dysphoric and non-dysphoric individuals reported a similar positive emotional

response, and after the mood induction no longer differed in levels of positive affect despite baseline differences.

Positive memory recall can be used to repair negative mood in healthy individuals, but has been shown to be an ineffective emotion regulation strategy for dysphoric, formerly depressed, and currently depressed individuals. However, if practice in field perspective imagery and explicitly adopting this perspective results in a similar positive emotional response as healthy individuals, this may improve the effectiveness of using positive memory recall as an emotion regulation strategy to overcome negative mood. Moreover, theories such as the broaden-and-build theory [22; 23] propose the experience of positive emotions to play a role in the development of psychological resilience. This highlights the need for effective procedures to evoke a positive emotional response in vulnerable populations with emotional disorder symptomatology. Interestingly, a recent study on prospective imagery in depressed individuals showed that vividness of positive prospective imagery predicted optimism levels over time [35]. Being able to vividly imagine a positive future may thus be an important 'skill' to boost optimism. Similarly, our findings could be relevant in the context of cognitive bias modification where the aim is to override habitual ways of processing of emotional information. For example, a recent meta-analysis on the effectiveness of cognitive bias modification procedures to train towards a benign interpretation bias shows that the use of imagery was related to larger cognitive and emotional effects [36].

A second aim of this study was to examine differences in effectivity of the positive mood induction between dysphoric individuals receiving instructions on field perspective imagery and dysphoric individuals who received no instructions on imagery. Results of the current study showed that the dysphoric individuals who did not receive instructions and practice in field perspective imagery adopted an observer perspective to a significantly higher extent than the dysphoric individuals who did receive these instructions, but there were no

significant differences in the reported use of field perspective. This is in line with previous findings showing that dysphoric individuals - without specific instructions - have a greater tendency to adopt an observer perspective when retrieving (positive) memories [14].

The differences in the ratings of adopting an observer perspective between dysphoric individuals receiving instructions on field perspective imagery and those who did not, did not seem to directly influence the increase in positive affect. Furthermore, the two MIP groups did not significantly differ in the change in positive affect across the mood induction. Results did show though that the group receiving instructions on field perspective imagery reported higher levels of positive affect after the induction, when controlling for positive affect at baseline. This might be due to the fact that the latter analysis had more statistical power to detect differences between the group who received explicit instructions to use field perspective imagery and those who did not. The differential effect may thus not be large, and in our dysphoric sample the effect of positive memory recall on positive affect cannot only be attributed to the use of field perspective imagery. However, it's possible that in more severely depressed individuals the difference in positive emotional response would be more pronounced, depending on whether people received explicit instructions to use field perspective imagery. A possible mechanism mediating the differential effects of imagery perspective could be that observer perspective imagery promotes evaluative thinking and increases the likelihood that the self is compared to an ideal standard, which could promote unfavorable self-comparisons especially in depressed individuals, reducing the positive emotional response [7; 11]. However, this remains speculation as the current findings do not allow us to draw conclusions about mechanisms underlying the differential effects of imagery perspective.

There are several limitations to be noted regarding this study. First, we investigated a dysphoric sample and not a clinically depressed sample. However, dysphoric people are at

risk for developing a depression and previous studies have shown similar results with regard to the higher occurrence of observer memories in both depressed and dysphoric samples [11; 14]. Moreover, investigating sub-clinical populations is relevant as use of mental imagery in relapse prevention would most likely target remitted- or sub-clinical populations. Secondly, due to the way data was collected for the extra control condition we did not randomly allocate the dysphoric individuals receiving no instructions on imagery to their MIP condition. This therefore violates design-based assumptions to statistical inference regarding the assumption of randomization during sampling. However, the issue of randomization does not necessarily influences model-based assumptions for statistical inference (e.g. distributional assumptions). A third limitation of this study regards the measurement scale to assess the extent to which participants adopted a field and observer perspective during imagery. The Likert scale may not have allowed for enough variance in reports on the adopted perspective to detect subtle differences between non-dysphoric and dysphoric participants, or participants receiving imagery instructions and those not. Furthermore, future research could also include manipulation checks assessing effort to adopt each perspective as it may be possible that dysphoric/depressed people, when instructed, adopt a field perspective to the same extent as healthy controls, but that this is more effortful for them.

To summarize, results showed that when dysphoric and non-dysphoric individuals received instructions and practice in using field perspective imagery, dysphoric people imagined their positive autobiographical memories from a field and observer perspective to the same extent as non-dysphoric individuals. Moreover this resulted in a similar positive emotional response following imagery of their specific positive memories. However, when dysphoric individuals did not receive such instructions, allowing for a more spontaneous way of processing their memory, they reported to adopt an observer perspective to a higher extent. Although the change in positive mood did not seem to significantly differ between these

groups, higher levels of positive affect after memory recall were reported by the dysphoric individuals receiving instructions on field perspective imagery. This underscores the importance of providing explicit instructions on imagery perspective when using positive mental imagery in a (sub-clinical) depressed group. Such practice could potentially improve the effectiveness of positive memory recall as a mood repair strategy in (sub-clinically) depressed individuals, and may therefore have important therapeutic benefits.

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